Complete Summary

GUIDELINE TITLE

Management of patients with stroke or TIA: assessment, investigation, immediate management and secondary prevention. A national clinical guideline.

BIBLIOGRAPHIC SOURCE(S)

Management of patients with stroke or TIA: assessment, investigation, immediate management and secondary prevention. A national clinical guideline. Edinburgh (Scotland): Scottish Intercollegiate Guidelines Network (SIGN); 2008. 103 p. (SIGN publication; no. 108). [300 references]

GUIDELINE STATUS

This is the current release of the guideline.

This guideline will be considered for review in three years. Any updates to the guideline in the interim period will be noted on Scottish Intercollegiate Guidelines Network (SIGN) Web site.

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

- Ischaemic stroke
- Transient ischaemic attack (TIA)
- Primary intracerebral haemorrhage (PICH)
- Asymptomatic carotid disease

GUIDELINE CATEGORY

Diagnosis
Management
Prevention
Risk Assessment
Treatment

CLINICAL SPECIALTY

Cardiology
Critical Care
Emergency Medicine
Family Practice
Geriatrics
Internal Medicine
Neurology
Nursing
Pharmacology
Physical Medicine and Rehabilitation
Preventive Medicine
Radiology
Speech-Language Pathology
Surgery

INTENDED USERS

Advanced Practice Nurses
Allied Health Personnel
Emergency Medical Technicians/Paramedics
Hospitals
Nurses
Occupational Therapists
Pharmacists
Physical Therapists
Physician Assistants
Physicians
Public Health Departments
Speech-Language Pathologists

GUIDELINE OBJECTIVE(S)

- To provide updated guidelines that follow the patient pathway from the onset of suspected stroke and cover the management of suspected stroke by non-stroke specialist practitioners, and clinical and radiological assessment
- To provide updated guidelines on the treatment, monitoring and prevention of recurrent stoke in patients with ischaemic stroke, transient ischaemic attack (TIA), primary intracerebral haemorrhage (PICH) and asymptomatic carotid disease
- To address the information and support needs of patients and carers

TARGET POPULATION

Patients with ischaemic stroke, transient ischaemic attack (TIA), primary intracerebral haemorrhage (PICH) or asymptomatic carotid disease

Note: This guideline does not address the management of patients with subarachnoid haemorrhage.

INTERVENTIONS AND PRACTICES CONSIDERED

Diagnosis/Risk Assessment

1. Emergency medical services
2. In-hospital care
3. Brain imaging: computed tomography (CT) scanning or magnetic resonance imaging (MRI)
4. Carotid evaluation
5. Cardiac imaging: echocardiography
6. Laboratory testing (routine thrombophilia screens, antiphospholipid antibodies, and other auto-antibodies or homocysteine levels are not recommended)
7. Life-style assessment (diet, smoking, exercise)

Treatment of Ischaemic Stroke

1. Thrombolysis (intravenous and intra-arterial)
2. Antiplatelet agents
3. Anticoagulants (not recommended for acute stroke)
4. Decompressive surgery
5. Mechanical reperfusion (clot retrieval)

Treatment of Primary Intracerebral Haemorrhage

1. Haematoma evacuation
2. Reducing raised intracranial pressure (corticosteroids not recommended; mannitol not routinely recommended)

Treatment of Other Causes of Stroke

1. Anticoagulants for cerebral venous thrombosis
2. Anticoagulants or antiplatelet therapy with extracranial cervical arterial dissection
3. Endovascular stenting

Management

1. Fluid replacement therapy
2. Blood pressure management
3. Blood glucose management
4. Feeding
5. Hyperbaric oxygen therapy
6. Management of pyrexia
7. Early mobilisation
8. Physical therapy

9. Active positioning

Carotid Intervention

1. Carotid endarterectomy
2. Surgical techniques
3. Carotid angioplasty and stenting
4. Periprocedural antiplatelet or antithrombotic therapy

Prevention of Recurrent Stroke

1. Antiplatelet agents
2. Statins
3. Anticoagulants (not recommended in patients with non-cardioembolic ischaemic stroke)
4. Antihypertensives
5. Statins (based on risk-benefit)
6. Promoting lifestyle changes
7. Provision of Information

MAJOR OUTCOMES CONSIDERED

- Mortality and morbidity rate in patients with stroke or transient ischaemic attack (TIA)
- Vascular events
- Risk of further stroke
- Cost-effectiveness of type and timing of imaging and treatment
- Time to diagnosis and treatment
- Sensitivity, specificity, and predictive value of evaluation methods
- Rate and type of adverse effects from treatment
- Length of hospitalization

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Systematic Literature Review

The evidence base for this guideline was synthesised in accordance with Scottish Intercollegiate Guidelines Network (SIGN) methodology. A systematic review of the literature was carried out using an explicit search strategy devised by a SIGN Information Officer. Databases searched include Medline, Embase, Cinahl, PsycINFO, and the Cochrane Library. The year range covered was 2000-2007. Internet searches were carried out on various websites including the US National Guidelines Clearinghouse. The main searches were supplemented by material identified by individual members of the development group. Each of the selected

papers was evaluated by two members of the group using standard SIGN methodological checklists before conclusions were considered as evidence.

Literature Search for Economic Issues

A SIGN Information Officer conducted a literature search of the NHS Economics Evaluations Database (NEED) for studies that highlighted economic issues related to management of acute stroke.

Literature Search for Patient Issues

At the start of the guideline development process, a SIGN Information Officer conducted a literature search for qualitative and quantitative studies that addressed patient issues of relevance to the acute phase of stroke. Databases searched include Medline, Embase, Cinahl and PsycINFO, and the results were summarised and presented to the guideline development group. A copy of the Medline version of the patient search strategy is available on the SIGN website.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Levels of Evidence

1++: High quality meta-analyses, systematic reviews of randomised controlled trials (RCTs), or RCTs with a very low risk of bias

1+: Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias

1-: Meta-analyses, systematic reviews, or RCTs with a high risk of bias

2++: High quality systematic reviews of case control or cohort studies

> High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal

2+: Well-conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal

2-: Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal

3: Non-analytic studies (e.g., case reports, case series)

4: Expert opinion

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review
Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Once papers have been selected as potential sources of evidence, the methodology used in each study is assessed to ensure its validity. The result of this assessment will affect the level of evidence allocated to the paper, which will in turn influence the grade of recommendation that it supports.

The methodological assessment is based on a number of key questions that focus on those aspects of the study design that research has shown to have a significant influence on the validity of the results reported and conclusions drawn. These key questions differ between study types, and a range of checklists is used to bring a degree of consistency to the assessment process. Scottish Intercollegiate Guidelines Network (SIGN) has based its assessments on the MERGE (Method for Evaluating Research and Guideline Evidence) checklists developed by the New South Wales Department of Health, which have been subjected to wide consultation and evaluation. These checklists were subjected to detailed evaluation and adaptation to meet SIGN's requirements for a balance between methodological rigour and practicality of use.

The assessment process inevitably involves a degree of subjective judgement. The extent to which a study meets a particular criterion - e.g., an acceptable level of loss to follow up - and, more importantly, the likely impact of this on the reported results from the study will depend on the clinical context. To minimise any potential bias resulting from this, each study must be evaluated independently by at least two group members. Any differences in assessment should then be discussed by the full group. Where differences cannot be resolved, an independent reviewer or an experienced member of SIGN Executive staff will arbitrate to reach an agreed quality assessment.

Evidence Tables

Evidence tables are compiled by SIGN Executive staff based on the quality assessments of individual studies provided by guideline development group members. The tables summarise all the validated studies identified from the systematic literature review relating to each key question. They are presented in a standard format to make it easier to compare results across studies, and present separately the evidence for each outcome measure used in the published studies. These evidence tables form an essential part of the guideline development record and ensure that the basis of the guideline development group's recommendations is transparent.

Additional details can be found in the companion document titled "SIGN 50: A Guideline Developers' Handbook." (Edinburgh [UK]: Scottish Intercollegiate Guidelines Network. [SIGN publication; no. 50]), available from the SIGN Web site.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Synthesising the Evidence

Guideline recommendations are graded to differentiate between those based on strong evidence and those based on weak evidence. This judgement is made on the basis of an (objective) assessment of the design and quality of each study and a (perhaps more subjective) judgement on the consistency, clinical relevance and external validity of the whole body of evidence. The aim is to produce a recommendation that is evidence-based, but which is relevant to the way in which health care is delivered in Scotland and is therefore implementable.

It is important to emphasise that the grading does not relate to the importance of the recommendation, but to the strength of the supporting evidence and, in particular, to the predictive power of the study designs from which that data was obtained. Thus, the grading assigned to a recommendation indicates to users the likelihood that, if that recommendation is implemented, the predicted outcome will be achieved.

Considered Judgement

It is rare for the evidence to show clearly and unambiguously what course of action should be recommended for any given question. Consequently, it is not always clear to those who were not involved in the decision making process how guideline developers were able to arrive at their recommendations, given the evidence they had to base them on. In order to address this problem, SIGN has introduced the concept of considered judgement.

Under the heading of considered judgement, guideline development groups summarise their view of the total body of evidence covered by each evidence table. This summary view is expected to cover the following aspects:

- Quantity, quality, and consistency of evidence
- External validity (generalizability) of studies
- Directness of application to the target population for the guideline.
- Any evidence of potential harms associated with implementation of a recommendation
- Clinical impact (i.e., the extent of the impact on the target patient population, and the resources required by NHS Scotland to treat them in accordance with the recommendation)

- Whether, and to what extent, any equality groups may be particularly advantaged or disadvantaged by the recommendations made
- Implementability (i.e., how practical it would be for the NHS Scotland to implement the recommendation)

Guideline development groups are provided with a pro forma in which to record the main points from their considered judgement. Once they have considered these issues, the group is asked to summarise their view of the evidence and assign a level of evidence to it, before going on to derive a graded recommendation.

Additional detail about SIGN's process for formulating guideline recommendations is provided in Section 6 of the companion document titled "SIGN 50: A Guideline Developers' Handbook." (Edinburgh [UK]: Scottish Intercollegiate Guidelines Network. [SIGN publication; no. 50], available from the SIGN Web site.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Grades of Recommendations

Note: The grade of recommendation relates to the strength of the evidence on which the recommendation is based. It does not reflect the clinical importance of the recommendation.

A. At least one meta-analysis, systematic review, or randomised controlled trial (RCT) rated as 1++ and directly applicable to the target population; *or*

A body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results

B. A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; *or*

Extrapolated evidence from studies rated as 1++ or 1+

C. A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; *or*

Extrapolated evidence from studies rated as 2++

D. Evidence level 3 or 4; *or*

Extrapolated evidence from studies rated as 2+

Good Practice Points: Recommended best practice based on the clinical experience of the guideline development group

COST ANALYSIS

Timing of Imaging

- The most cost-effective strategy, in terms of least overall cost and most quality adjusted life years (QALYs) after adjusting for different age ranges, proportions of infarcts and accuracy of CT, was to scan all patients immediately.

Carotid Imaging in Patients with Carotid Territory Transient Ischaemic Attack (TIA) or Stroke and/or Retinal Event

- A good quality meta-analysis showed that the most cost-effective diagnostic strategies for carotid stenosis are those that offer surgery to a larger proportion of patients quickly after the warning TIA/minor stroke.
- Cost-effectiveness modelling shows the best strategy is to offer surgery to a larger proportion of patients earlier than is currently the case in Scotland.

Cardiac Imaging

- A health technology assessment (HTA) assessed clinical and cost effectiveness of echocardiography in stroke. The meta-analysis confirmed that there is insufficient evidence to make recommendations on the use of echocardiography in all patients with stroke.
- In the absence of significant carotid disease echocardiography may identify intracardiac thrombus in stroke patients with atrial fibrillation or evidence of recent myocardial infarction. The distinction between trans-thoracic and trans-oesophageal echocardiography is unclear. The latter has higher accuracy for intracardiac thrombus, but may be associated with increased complications in patients with acute stroke. It is also more expensive, reducing its ultimate cost effectiveness.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

National Open Meeting

A national open meeting is the main consultative phase of SIGN guideline development, at which the guideline development group presents its draft recommendations for the first time. The national open meeting for this guideline was held on 26th June 2007 and was attended by 317 representatives of all the key specialties relevant to the guideline. The draft guideline was also available on the SIGN website for a limited period at this stage to allow those unable to attend the meeting to contribute to the development of the guideline.

Specialist Review

This guideline was also reviewed in draft form by the following independent expert referees, who were asked to comment primarily on the comprehensiveness and

accuracy of interpretation of the evidence base supporting the recommendations in the guideline. The guideline group addresses every comment made by an external reviewer, and must justify any disagreement with the reviewers' comments.

SIGN Editorial Group

As a final quality control check, the guideline is reviewed by an editorial group comprising the relevant specialty representatives on SIGN Council to ensure that the specialist reviewers' comments have been addressed adequately and that any risk of bias in the guideline development process as a whole has been minimised.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Note from the Scottish Intercollegiate Guidelines Network (SIGN) and National Guideline Clearinghouse (NGC)*: In addition to these evidence-based recommendations, the guideline development group also identifies points of best clinical practice in the full-text guideline document*.

The grades of recommendations (A-D) and levels of evidence (1++, 1+, 1-, 2++, 2+, 2-, 3, 4) are defined at the end of the "Major Recommendations" field.

Management of Suspected Stroke or Transient Ischaemic Attack (TIA)

Systems of Care

B - Emergency medical services should be redesigned to facilitate rapid access to specialist stoke services.

Pre-Hospital

Pre-Hospital Assessment

C - Standard assessment scales such as face arm speech test (FAST) or Melbourne acute stroke scale (MASS) are recommended for pre-hospital assessment to:

- Increase the accuracy of the initial stroke diagnosis
- Assist with more rapid diagnosis
- Speed up consideration for treatment
- Assist with more rapid referral to specialist services

In-Hospital

In-Hospital Assessment

C - Standard assessment scales such as recognition of stroke in the emergency room (ROSIER) are recommended for emergency department staff to:

- Increase the accuracy of the initial stroke diagnosis
- Assist with more rapid diagnosis

In-Hospital Care

A - Stroke patients requiring admission to hospital should be admitted to a stroke unit staffed by a coordinated multidisciplinary team with a special interest in stroke care.

B - Patients with TIA and minor stoke, who are at high risk of early recurrence, should undergo specialist assessment and begin treatment promptly.

Integrated Care Pathways

B - The routine implementation of care pathways for acute stroke management or stroke rehabilitation is not recommended where a well organized multidisciplinary model of care exists.

Telemedicine Consultation

B - In areas without a local stroke specialist, telemedicine consultation should be considered to facilitate treatment in patients eligible for thrombolysis.

Assessment, Diagnosis and Investigation

Clinical Assessment

Risk of Recurrence

C - The ABCD (age, blood pressure, clinical features and duration of symptoms) score should be used to identify patients who are at highest risk of recurrent stroke to allow very rapid investigation and treatment.

Assessment of Degree of Dependency

C - Impairment scales should be considered to help discussion of likely outcomes after stroke with patients and carers.

Brain imagining for Suspected Acute Stroke or TIA

Timing of Imaging

A - All patients with suspected stroke should have brain imaging immediately on presentation.

Modality of Imaging

B - Computed tomography (CT) scanning is recommended for most patients in the acute phase of stroke.

B - Magnetic resonance imaging (MRI) with diffusion weighted and gradient echo sequences is recommended (where available and practical) for the diagnosis of acute stroke syndromes in patients who:

- Are not severely ill, especially where either neurological deficit is mild and clinical likelihood is that the lesion is small or lies in the posterior fossa or
- Present late (after one week)

Who Should Interpret the Brain Scan?

C - Unenhanced CT brain scans for detection of early changes of infarction should be interpreted by personnel trained and experienced in stroke radiology.

D - Medical personnel trained and experienced in stroke radiology should interpret CT and MRI brain scans from all time frames.

Carotid Evaluation

Carotid Imaging in Patients with Carotid Territory TIA or Stroke and/or Retinal Event

A - All patients with non-disabling acute stroke syndrome /TIA in the carotid territory who are potential candidates for carotid surgery should have carotid imaging.

C - Initial carotid imaging with duplex ultrasound or alternative should be performed rapidly once a diagnosis of ischaemic stroke or TIA in the carotid territory is made.

C - Corroborative imaging is recommended to confirm and more accurately grade carotid disease if duplex carotid ultrasound is abnormal.

C - Non-invasive angiographic carotid imaging (CE-MRA) should be performed and interpreted by radiologists specifically trained and with specialist interested in vascular imaging.

Cardiac Imaging

B - The routine use of echocardiography with contrast media for evaluation of patients with stroke is not recommended.

B - Echocardiography should be considered in patients with:

- Clinical findings and/or baseline investigations suggesting cardiac disease
- Cryptogenic stroke

Diagnostic Tests

C - The routine requesting of thrombophilia screens, antiphospholipid antibodies, other auto-antibodies or homocysteine levels is not recommended.

Treatment of Ischaemic Stroke

Thrombolysis

Intravenous Thrombolysis

A - Patients admitted with stroke within four and a half hours of definite onset of symptoms, who are considered suitable, should be treated with 0.9 mg/kg (up to maximum 90 mg) intravenous recombinant tissue plasminogen activator (rt-PA).

A -

- Onset to treatment time should be minimised.
- Systems should be optimised to allow the earliest possible delivery of intravenous rt-PA within the defined time window.

A - Streptokinase should not be used for treatment of patients in the acute phase of stroke.

Intra-Arterial Thrombolysis

B - Intra-arterial thrombolysis may be considered for patients with proximal middle cerebral artery occlusion or basilar artery occlusion that presents beyond four and a half hours.

B - Treatment should be delivered within six hours of symptom onset in patients with middle cerebral artery occlusion.

Antiplatelet Agents

Aspirin

A - Aspirin 300 mg daily should be commenced within 48 hours of ischaemic stroke and continued for at least 14 days.

Anticoagulants

Fibrinogen-Depleting Agents

A -

- The routine use of anticoagulants (unfractionated heparin [UFH], low molecular weight heparins [LMWHs], heparinoids, oral anticoagulants, direct thrombin inhibitors, fibrinogen-depleting agents) is not recommended for the treatment of acute ischaemic stroke.
- Anticoagulants are not recommended in patients with progressing stroke.

A - In patients at high risk of venous thromboembolic disease LMWH should be considered in preference to UFH.

D - Following administration of intravenous (IV) thrombolysis, heparin should not be given in any form for 24 hours.

C - For patients in atrial fibrillation following stroke, anticoagulation with warfarin can be introduced early in patients with minor stroke or TIA, but should be deferred for two weeks after onset in those with major stroke.

Decompressive Surgery

A - For individuals aged up to 60 years who suffer an acute middle cerebral artery (MCA) territory ischaemic stroke complicated by massive cerebral oedema, surgical decompression by hemicraniectomy should be offered within 48 hours of stroke onset.

Mechanical Reperfusion

Clot Retrieval

C - Mechanical clot retrieval devices, when used by experienced interventional neuroradiologists, may be considered in patients:

- Ineligible for thrombolytic drug therapy
- Who have failed to improve clinically or recanalise following intravenous thrombolysis

Transcranial Doppler and Thrombolysis

B - Transcranial Doppler (TCD) ultrasound at lower (kilohertz) frequencies is not recommended.

Treatment of Primary Intracerebral Haemorrhage

Haematoma Evacuation

A - Routine surgical evacuation by craniotomy is not recommended for supratentorial primary intracerebral haematoma.

B - If surgical evacuation of primary intracerebral haematoma is considered:

- Minimally invasive procedures including stereotaxy-guided evacuation should be considered as an alternative to craniotomy
- Early intervention (within eight hours of symptom onset) is recommended

Reducing Raised Intracranial Pressure

Corticosteroids

B - Corticosteroids should not be used for treatment of primary intracerebral haemorrhage.

Mannitol

B - Intravenous mannitol should not be used routinely for treatment of raised intracranial pressure in patients with primary intracerebral haemorrhage.

Other Causes of Stroke

Cerebral Venous Thrombosis

Anticoagulants

C - Intravenous UFH or subcutaneous LMWH followed by warfarin therapy should be considered in patients with cerebral venous thrombosis.

Extracranial Cervical Arterial Dissection

Anticoagulants and Antiplatelets

D - In patients with extracranial cervical arterial dissection consider treatment with either:

- Anticoagulation for three to six months
- Antiplatelet agents

Endovascular Stenting

D - Endovascular stenting is not routinely recommended for extracranial cervical arterial dissection or cervical artery pseudo-aneurysms.

Physiological Monitoring and Intervention

Physiological Intervention

Fluid Replacement Therapy

B - To prevent iatrogenic hyperglycaemia, intravenous saline infusion is preferable to glucose containing preparations.

A - Haemodilution is not recommended as a routine treatment in acute stroke with the possible exception of patients with polycythaemia.

C - For patients in whom intravenous fluids are not appropriate, subcutaneous fluids can be used to maintain plasma osmolality within the normal range.

Blood Pressure Management

A - Blood pressure should not be actively managed as a routine in patients in the acute phase of ischaemic stroke.

Blood Glucose Management

B - Routine use of insulin regimens to lower blood glucose in patients with moderate hyperglycaemia after acute stroke is not recommended.

C - Patients with hyperglycaemia (random blood glucose > 7 mmol/L) should be formally assessed (by oral glucose tolerance test [OGTT]) to exclude or confirm a diagnosis of impaired glucose tolerance or diabetes.

Feeding

A - Early placement of a nasogastric feeding tube should be considered in patients identified as unable to take adequate oral intake.

A - Routine use of nutritional supplements is not recommended.

Supplementary Oxygen Therapy

A - Hyperbaric oxygen therapy for patients with acute ischaemic stroke is not recommended outwith the setting of a clinical trial.

Management of Pyrexia

C - Increased body temperature should be investigated and antipyretic medications may be administered to assist in lowering the body temperature.

Early Mobilisation

A - Early mobilisation, including positioning in bed, sitting on the edge of the bed, or standing up should be considered for patients within the first three days after a stroke.

Physical Therapy

D -

- Patients' suitability for early, active rehabilitation should be considered.
- Healthcare professionals managing patients in the acute phase of stroke should consider how to actively engage patients throughout the day.

Active Positioning

C -

- Patients should be placed in an upright sitting position, if their medical condition allows.
- Hypoxia inducing positions (or left side or slumped in a chair) should be avoided.

Preventing Recurrent Stroke in Patients with Ischaemic Stroke or TIA

Antiplatelet Agents

Combination Therapy

A - Low-dose aspirin (75 mg daily) and dipyridamole (200 mg modified release twice daily) should be prescribed after ischaemic stroke or TIA for secondary prevention of vascular events.

B - Dose titration of dipyridamole may help to reduce the incidence of headache.

A - Clopidogrel (75 mg daily) monotherapy should be considered as an alternative to combination aspirin and dipyridamole after ischaemic stroke or TIA for secondary prevention of vascular events.

A - The combination of aspirin and clopidogrel is not recommended for long term secondary prevention is ischaemic stroke or TIA.

Statins

A - A statin should be prescribed to patients who have had an ischaemic stroke, irrespective of cholesterol level.

A - Atorvastatin (80 mg) should be considered for patients with TIA or ischaemic stroke.

A - Other statins (such as simvastatin 40 mg) may also be considered as they reduce the risk of major vascular events.

A - Statin therapy for prevention of further vascular events post-haemorrhagic stroke is not recommended routinely unless the risk of further vascular events outweighs the risk of further haemorrhage.

Anticoagulants

Patients with Non-Cardioembolic Ischaemic Stroke

A - Anticoagulation is not recommended for preventing recurrent stroke in patients with non-cardioembolic ischaemic stroke.

Patients with Non-Rheumatic Atrial Fibrillation and Ischaemic Stroke

A - Patients with ischaemic stroke or TIA who are in atrial fibrillation should be offered warfarin with target international normalized ratio (INR) 2.0-3.0.

B - In the absence of contraindications and patient preference for alternative treatment, warfarin should be offered routinely to elderly patients (>75 years) with ischaemic stroke or TIA who are in atrial fibrillation.

Antihypertensives

A - All patients with a previous stroke or TIA should be considered for treatment with an angiotensin-converting enzyme (ACE) inhibitor (for example, perindopril)

and thiazide (for example, indapamide) regardless of blood pressure, unless contraindicated.

D - Patients with hypertension should be treated to <140/85 mm Hg (<130/80 mm Hg for patients with diabetes).

Patent Foramen Ovale and Stroke

B - Patients with cryptogenic stroke and patent foramen ovale (PFO) should be treated with antiplatelet therapy to reduce the risk of recurrence.

D - Transcatheter closure of PFO may be considered for patients with recurrent cryptogenic stroke on optimal medical management.

Preventing Recurrent Stroke in Patients with Primary Intracerebral Haemorrhage

Blood Pressure Reduction

A - Lowering blood pressure *(non-acutely)* following intracerebral haemorrhage (ICH) using a combination therapy of ACE inhibitor and thiazide diuretic should be considered to prevent further vascular events.

Antiplatelet Agents

B - The use of aspirin following ICH is not recommended to prevent further vascular events when the risk of recurrence is low.

C - The use of aspirin following ICH may be considered when there is a high risk of cardiac ischaemic events.

Anticoagulants

D - Anticoagulation therapy following ICH is not recommended.

Statins

A - Statin therapy after haemorrhagic stroke is not routinely recommended unless the risk of further vascular events outweighs the risk of further haemorrhage.

Carotid Intervention

Carotid Endarterectomy

Symptomatic Carotid Artery Disease

A - All patients with carotid artery territory stroke (without severe disability, modified Rankin scale [mRS] ≤2) or transient ischaemic attack should be considered for carotid endarterectomy as soon as possible after the index event.

A - Carotid endarterectomy (on the internal carotid artery ipsilateral to the cerebrovascular event) should be considered in all:

- Male patients with a carotid artery stenosis of 50-99% (by North American Symptomatic Carotid Endarterectomy Trial [NASCET] method)
- Female patients with a carotid artery stenosis of 70-99%

B - For all patients, carotid endarterectomy should be performed as soon as the patient is stable and fit for surgery, ideally within two weeks of event.

B - There is no justification for withholding carotid endarterectomy from older patients who are considered fit for surgery.

A - All patients undergoing carotid endarterectomy should receive optimal medical therapy in addition to surgery.

Asymptomatic Carotid Artery Disease

A - Carotid endarterectomy (CEA) should be considered for asymptomatic patients with high grade carotid stenosis and no ipsilateral event for at least six months.

B - CEA should only be performed by operators with a low (<3%) perioperative stroke or death rate.

Carotid Surgery Technique

A - Patch angioplasty should be used as the closure method in all carotid endarterectomies performed by conventional methods.

A - Changing surgical technique from conventional carotid endarterectomy to eversion method is not recommended.

A - The choice of anaesthetic technique for patients undergoing surgery should be made by the individual operator/anaesthetist.

Carotid Angioplasty and Stenting

A - Carotid angioplasty and stenting is not recommended outwith ongoing randomised controlled trials.

Periprocedural Antiplatelet or Antithrombotic Therapy

A - Standard antiplatelet treatment should be given after CEA.

Promoting Lifestyle Changes

Altering Dietary Fat Intake

A - Diets low in total and saturated fats should be recommended to all for the reduction of cardiovascular risk.

Reducing Dietary Salt

A - People with hypertension should be advised to reduce their salt intake as much as possible to lower blood pressure.

Fruit and Vegetable Consumption

C - Increasing fruit and vegetables consumption is recommended to reduce risk of stroke or TIA.

Vitamin Supplements

B - Vitamin supplementation is not recommended in patients following ischaemic stroke.

Weight Reduction

B - Patients and individuals at risk of cardiovascular disease, who are overweight, should be targeted with interventions designed to reduce weight, and to maintain this reduction.

Smoking

B - All people who smoke should be advised to stop and offered support to help facilitate this in order to minimise cardiovascular and general health risks.

Exercise

B - Lifelong participation in programmes of exercise after stroke should be encouraged.

Provision of Information

Providing Information and Support

Information Needs of Patients and Carers in the Acute Phase of Stroke

D - Each patient should be individually assessed on his or her readiness to receive information.

D - Healthcare professionals should take a patient's age, gender, educational status and communication support needs into account when assessing their need for information.

A - Information should be offered to patients and carers in a variety of formats, including easy access.

D - Information should be tailored to the phase of the patient's journey.

D - Information should be repeated and re-offered at appropriate intervals.

D - Healthcare professionals should actively involve carers and find out what support they need.

A - Caregivers should be offered ongoing practical information and training individualized for the needs of the person for whom they are caring.

D - Carers' support needs should be addressed prior to patient discharge.

Definitions:

Grades of Recommendations

Note: The grade of recommendation relates to the strength of the evidence on which the recommendation is based. It does not reflect the clinical importance of the recommendation.

A. At least one meta-analysis, systematic review, or randomised controlled trial (RCT) rated as 1++ and directly applicable to the target population; *or*

> A body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results

B. A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; *or*

> Extrapolated evidence from studies rated as 1++ or 1+

C. A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; *or*

> Extrapolated evidence from studies rated as 2++

D. Evidence level 3 or 4; *or*

> Extrapolated evidence from studies rated as 2+

Good Practice Points: Recommended best practice based on the clinical experience of the guideline development group

Levels of Evidence

1++: High quality meta-analyses, systematic reviews of randomised controlled trials (RCTs), or RCTs with a very low risk of bias

1+: Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias

1-: Meta-analyses, systematic reviews, or RCTs with a high risk of bias

2++: High quality systematic reviews of case control or cohort studies

High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal

2+: Well-conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal

2-: Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal

3: Non-analytic studies (e.g., case reports, case series)

4: Expert opinion

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- Rapid administration of appropriate treatment for stroke and transient ischaemic attack (TIA)
- Reduced morbidity and mortality from stroke and TIA
- Reduction in the recurrence of stroke or TIA

POTENTIAL HARMS

- Potential side effects associated with antiplatelet agents, anticoagulants, statins and antihypertensives
- Potential side effects associated with surgery

CONTRAINDICATIONS

CONTRAINDICATIONS

- Magnetic resonance imaging (MRI) may be contraindicated in up to a fifth of patients because they are too ill, confused, dysphasic, have an intraocular or intracerebral metallic foreign body or have a pacemaker.
- The administration of anticoagulants is contraindicated during the first 24 hours after IV thrombolytic therapy.
- Streptokinase should not be used for treatment of patients in the acute phase of stroke.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

- This guideline is not intended to be construed or to serve as a standard of care. Standards of care are determined on the basis of all clinical data available for an individual case and are subject to change as scientific knowledge and technology advance and patterns of care evolve. Adherence to guideline recommendations will not ensure a successful outcome in every case, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgement must be made by the appropriate healthcare professional(s) responsible for clinical decisions regarding a particular clinical procedure or treatment plan. This judgement should only be arrived at following discussion of the options with the patient, covering the diagnostic and treatment choices available. It is advised, however, that significant departures from the national guideline or any local guidelines derived from it should be fully documented in the patient's case notes at the time the relevant decision is taken.
- Any practitioner following a SIGN recommendation and prescribing a licensed medicine outwith the product licence needs to be aware that they are responsible for this decision, and in the event of adverse outcomes, may be required to justify the actions that they have taken.
- Prior to prescribing, the licensing status of a medication should be checked in the current version of the British National Formulary (BNF).

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

Implementation of national clinical guidelines is the responsibility of each NHS Board and is an essential part of clinical governance. Mechanisms should be in place to review care provided against the guideline recommendations. The reasons for any differences should be assessed and addressed where appropriate. Local arrangements should then be made to implement the national guideline in individual hospitals, units and practices.

Resource Implications of Key Recommendations

A National Clinical and Resource Impact Assessment based on recommendations identified by the guideline development group likely to have major resource implications will be available from the Scottish Health Technologies Group (http://www.nhshealthquality.org/) in 2009. The assessment will summarise the

likely resources required and the associated costs of implementing the guideline, with the objective of facilitating more rapid implementation.

Auditing Current Practice

A first step in implementing a clinical practice guideline is to gain an understanding of current clinical practice. Audit tools designed around guideline recommendations can assist in this process. Audit tools should be comprehensive but not time consuming to use. Successful implementation and audit of guideline recommendations requires good communication between staff and multidisciplinary team working.

Mandatory Core Data Set

The clinically led Scottish Stroke Care Audit aims to improve the quality of care provided by the hospitals in all NHS Boards by collating and reporting upon data collected by the Managed Clinical Networks (MCNs).

The system collects a mandatory core data set for each episode which leads a patient to be referred to a hospital. A minimum dataset has been defined which has the mandatory core data at its centre but which aims to provide information to reflect the quality of the stroke service. This dataset includes six variables which describe case mix and allows correction of case fatality and functional outcome data. This minimum dataset will provide information on:

- Patient demographics
- The process of care and its appropriateness
- The performance of services in relation to the national clinical standards

National Time-limited Audits of Specific Aspects of Stroke Service

Although the minimum dataset reflects aspects of stroke services for which there is very robust evidence that compliance will influence patient outcomes, the quality of many other aspects of stroke care also needs to be addressed. This can be achieved by defining an extended data set to be collected for each patient for a set period of time.

Key Points to Audit

In addition the guideline development group has identified the following as key points to audit to assist with the implementation of this guideline:

- Time to assessment of acute stroke patient
- Time to assessment of TIA patient
- Time to access proper multidisciplinary stroke unit
- Time to brain imaging
- Time to carotid assessment with duplex
- The performance of carotid duplex examinations when compared to other tests (usually CE-MRA)
- Carotid endarterectomy outcomes compared between centres

- Has recommended medication initiation occurred, where appropriate, prior to discharge from hospital (e.g., antiplatelet, statin, ACE inhibitor, diuretic)

IMPLEMENTATION TOOLS

Patient Resources
Quick Reference Guides/Physician Guides
Resources

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better
Staying Healthy

IOM DOMAIN

Effectiveness
Patient-centeredness
Safety

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Management of patients with stroke or TIA: assessment, investigation, immediate management and secondary prevention. A national clinical guideline. Edinburgh (Scotland): Scottish Intercollegiate Guidelines Network (SIGN); 2008. 103 p. (SIGN publication; no. 108). [300 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1997 May (revised 2008 Dec)

GUIDELINE DEVELOPER(S)

Scottish Intercollegiate Guidelines Network - National Government Agency [Non-U.S.]

SOURCE(S) OF FUNDING

Scottish Executive Health Department

GUIDELINE COMMITTEE

Not stated

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

All members of the guideline development group made declarations of interest and further details of these are available on request from the Scottish Intercollegiate Guidelines Network (SIGN) Executive.

GUIDELINE STATUS

This is the current release of the guideline.

This guideline will be considered for review in three years. Any updates to the guideline in the interim period will be noted on Scottish Intercollegiate Guidelines Network (SIGN) Web site.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the Scottish Intercollegiate Guidelines Network (SIGN) Web site.

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- Quick reference guide: Management of patients with stroke or TIA: assessment, investigation, immediate management and secondary prevention. Edinburgh (Scotland): Scottish Intercollegiate Guidelines Network, 2008 Dec. 2 p. Available in Portable Document Format (PDF) from the Scottish Intercollegiate Guidelines Network (SIGN) Web site.
- Supplementary material. Management of patients with stroke or TIA: assessment, investigation, immediate management and secondary prevention. Edinburgh (Scotland): Scottish Intercollegiate Guidelines Network, 2008. 2 p. Available in Portable Document Format (PDF) from the SIGN Web site.
- SIGN 50: A guideline developer's handbook. Edinburgh (Scotland): Scottish Intercollegiate Guidelines Network, 2001 Feb. (SIGN publication; no. 50). Electronic copies available from the SIGN Web site.
- Appraising the quality of clinical guidelines. The SIGN guide to the AGREE (Appraisal of Guidelines Research & Evaluation) guideline appraisal instrument. Edinburgh (Scotland): Scottish Intercollegiate Guidelines Network, 2001. Available from the SIGN Web site.

PATIENT RESOURCES

The following is available:

- Stroke assessment. Booklet for patients. Edinburgh (Scotland): Scottish Intercollegiate Guidelines Network, 2008. 29 p. Available in Portable Document Format (PDF) from the Scottish Intercollegiate Guidelines Network (SIGN) Web site.

NGC STATUS

This summary was completed by ECRI on February 6, 2002. The information was verified by the guideline developer as of April 9, 2002. This summary was updated by ECRI Institute on June 12, 2009. The updated information was verified by the guideline developer on July 15, 2009.

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